

Claims

1. A positive electrode active material containing a compound represented by the general formula $\text{Li}_x\text{M}_y\text{PO}_4$, where $0 < x \leq 2$ and $0.8 \leq y \leq 1.2$, with M containing a 3d transition metal,

where said $\text{Li}_x\text{M}_y\text{PO}_4$ encompasses that with the grain size not larger than $10\ \mu\text{m}$.

2. The positive electrode active material according to claim 1 wherein said $\text{Li}_x\text{M}_y\text{PO}_4$ has a 10% cumulative volumetric size not larger than $1\ \mu\text{m}$.

3. The positive electrode active material according to claim 1 wherein said $\text{Li}_x\text{M}_y\text{PO}_4$ has a BET specific surface area of not less than $0.5\ \text{m}^2/\text{g}$.

4. The positive electrode active material according to claim 1 wherein said $\text{Li}_x\text{M}_y\text{PO}_4$ is LiFePO_4 .

5. A positive electrode active material containing a compound represented by the general formula $\text{Li}_x(\text{Fe}_y\text{M}_{1-y})\text{PO}_4$, where $0.9 \leq x \leq 1.1$ and $0 < y \leq 1$, with M containing a 3d transition metal,

wherein, in a spectrum for said $\text{Li}_x(\text{Fe}_y\text{M}_{1-y})\text{PO}_4$ obtained by the Moessbauer spectroscopic method, A/B is less than 0.3, where A is the area strength of a spectrum obtained by the Moessbauer spectroscopic method of not less than $0.1\ \text{mm/sec}$ and not larger than $0.7\ \text{mm/sec}$ and B is the area strength of a spectrum obtained by the Moessbauer spectroscopic method not less than $0.8\ \text{mm/sec}$ and not larger than $1.5\ \text{mm/sec}$.

6. The positive electrode active material according to claim 5 wherein said is $\text{Li}_x(\text{Fe}_y\text{M}_{1-y})\text{PO}_4$ is LiFePO_4 .

7. A non-aqueous electrolyte secondary battery comprising a positive electrode having a positive electrode active material containing a compound represented by the general formula $\text{Li}_x\text{M}_y\text{PO}_4$, where $0 < x \leq 2$ and $0.8 \leq y \leq 1.2$, with M containing a 3d transition metal, a negative electrode having a negative electrode active material, said positive electrode active material and the negative electrode active material being capable of reversibly doping/undoping lithium, and a non-aqueous electrolyte,

wherein said $\text{Li}_x\text{M}_y\text{PO}_4$ encompasses that with the grain size not larger than $10 \mu\text{m}$.

8. The non-aqueous electrolyte secondary battery according to claim 7 wherein said $\text{Li}_x\text{M}_y\text{PO}_4$ has a 10% cumulative volumetric size not larger than $1 \mu\text{m}$.

9. The non-aqueous electrolyte secondary battery according to claim 7 wherein said $\text{Li}_x\text{M}_y\text{PO}_4$ has a BET specific surface area of not less than $0.5 \text{ m}^2/\text{g}$.

10. The non-aqueous electrolyte secondary battery according to claim 7 wherein said $\text{Li}_x\text{M}_y\text{PO}_4$.

11. A non-aqueous electrolyte secondary battery comprising a positive electrode having a positive electrode active material containing a compound represented by the general formula $\text{Li}_x(\text{Fe}_y\text{M}_{1-y})\text{PO}_4$, where $0.9 \leq x \leq 1.1$ and $0 < y \leq 1$, with M containing a 3d transition metal, a negative electrode having a negative electrode active material, said positive electrode active material and the negative electrode

active material being capable of reversibly doping/undoping lithium, and a non-aqueous electrolyte,

wherein, in a spectrum for said $\text{Li}_x(\text{Fe}_y\text{M}_{1-y})\text{PO}_4$ obtained by the Moessbauer spectroscopic method, A/B , A/B is less than 0.3, where A is the area strength of a spectrum obtained by the Moessbauer spectroscopic method not less than 0.1 mm/sec and not larger than 0.7 mm/sec and B is the area strength of a spectrum obtained by the Moessbauer spectroscopic method not less than 0.8 mm/sec and not larger than 1.5 mm/sec.

12. The non-aqueous electrolyte secondary battery according to claim 11 wherein said $\text{Li}_x(\text{Fe}_y\text{M}_{1-y})\text{PO}_4$ is LiFePO_4 .

13. A method for producing a positive electrode active material comprising:

a mixing step of mixing a starting materials for synthesis of a compound represented by the general formula $\text{Li}_x\text{M}_y\text{PO}_4$, where $0 < x \leq 2$ and $0.8 \leq y \leq 1.2$, with M containing a 3d transition metal; and

a sintering step of sintering and reacting said precursor obtained in said mixing step;

wherein, in said sintering step, said precursor is sintered at a temperature not lower than 400°C and not higher than 700°C .

14. The method for producing a positive electrode active material according to claim 13 wherein, in said sintering step, said precursor is sintered at a temperature not lower than 400°C and not higher than 600°C .

15. The method for producing a positive electrode active material according to claim 13 wherein said $\text{Li}_x\text{M}_y\text{PO}_4$ is LiFePO_4 .